Amendment to the Claims

In the Claims:

Please cancel Claims 27, 28, 32, 35, 38, and 41-44.

Please amend Claims 16, 23, 24, 29, 30, 31, 33, 34, 36, 37, 39, and 40; and add new Claims 45-48, as follows:

1. (Previously Presented) A method for identifying a specific cell, to enable a determination to be made as to whether the specific cell corresponds to a known cell type, wherein the known cell type relates to the viability of the cell, comprising the steps of:

providing spatial frequency content data from a side scatter image of the known cell type;

directing incident light at the specific cell, using a detector to obtain the side scatter image of the specific cell; and

comparing the spatial frequency content of the side scatter image of the specific cell to the spatial frequency content data of the side scatter image of the known cell type to determine if the specific cell corresponds to the known cell type.

2. (Previously Presented) The method of claim 1 wherein there is relative motion between the specific cell and the detector.

3. (Previously Presented) The method of claim 1 wherein the specific cell identified is contained within a heterogeneous cell population, and side scatter image data is collected for the heterogeneous cell population.

4. (Original) The method of claim 1 wherein the specific cell identified is an apoptotic cell.

5. (Original) The method of claim 4 wherein the apoptotic cell is an early stage apoptotic cell or a late stage apoptotic cell.

6. (Original) The method of claim 1 wherein the specific cell identified is a necrotic cell.

7. (Original) The method of claim 1 wherein the specific cell identified is at least one of an apoptotic cell and a necrotic cell.

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8. (Previously Presented) A method for identifying a specific cell, to enable a determination to be made as to whether the specific cell corresponds to a known cell type, wherein the known cell type relates to the viability of the cell, comprising the steps of:

providing spatial frequency content data from a brightfield image of the known cell type;

directing incident light at the specific cell, using a detector to obtain the brightfield image of the specific cell; and

comparing the spatial frequency content of the brightfield image of the specific cell to the spatial frequency content data of the brightfield image of the known cell type to determine if the specific cell corresponds to the known cell type.

9. (Previously Presented) The method of claim 8 wherein there is relative motion between the specific cell and the detector.

10. (Previously Presented) The method of claim 8 wherein the specific cell identified is contained within a heterogeneous cell population, and brightfield image data is collected for the heterogeneous cell population.

11. (Original) The method of claim 8 wherein the specific cell identified is an apoptotic cell.

12. (Original) The method of claim 11 wherein the apoptotic cell is an early stage apoptotic cell or a late stage apoptotic cell.

13. (Original) The method of claim 8 wherein the specific cell identified is a necrotic cell.

14. (Original) The method of claim 8 wherein the specific cell identified is at least one of an apoptotic cell and a necrotic cell.

15. (Original) The method of claim 8 wherein the spatial frequency content is of the nucleus.

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16. (Currently Amended) A method for identifying a specific cell, to enable a determination to be made as to whether the specific cell corresponds to a known cell type, wherein the known cell type relates to the viability of the cell, comprising the steps of:

providing an image of the known cell type that has been marked with a single nuclear marker;

providing spatial frequency content data from the image of the known cell type that has been marked with the nuclear marker;

contacting the specific cell with the nuclear marker;

directing incident light at the marked specific cell;

using a detector to obtain an image of the marked specific cell; and

comparing the image of the marked specific cell and a spatial frequency content of the image of the marked specific cell to the marked image of the known cell type and the spatial frequency content of the marked image of the known cell type to determine if the specific cell corresponds to the known cell type.

17. (Previously Presented) The method of claim 16 wherein there is relative motion between the specific cell and the detector.

18. (Previously Presented) The method of claim 16 wherein the specific cell identified is contained within a heterogeneous cell population, and image data is collected for the heterogeneous cell population.

19. (Original) The method of claim 16 wherein the specific cell identified is an apoptotic cell.

20. (Original) The method of claim 19 wherein the apoptotic cell is an early stage apoptotic cell or a late stage apoptotic cell.

21. (Original) The method of claim 16 wherein the specific cell identified is a necrotic cell.

22. (Original) The method of claim 16 wherein the specific cell identified is at least one of an apoptotic cell and a necrotic cell.

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23. (Currently Amended) The method of claim 16 wherein a single nuclear marker is used, the single nuclear marker and the spatial frequency content of the image enabling one to classify the specific cell as one of the following cell types:

a viable cell having a cellular membrane that is impermeable to the nuclear marker;

a cell in an early stage of apoptosis and which has a cellular membrane that is impermeable to the nuclear marker;

a cell in a late stage of apoptosis and which has a cellular membrane that is permeable to the nuclear marker; and

a necrotic cell which has a cellular membrane that is permeable to the nuclear marker.

24. (Currently Amended) The method of claim [[16]] 23 wherein the single nuclear marker is 7-aminoactinomycin D.

25. – 28. (Cancelled)

29. (Currently Amended) A method for ~~identifying a specific cell, to determine a type of the specific cell, comprising the steps of~~ classifying a specific cell as one of the following four types of cells, a viable cell, a necrotic cell, an early apoptotic cell in which a cellular membrane of the cell is still intact, and a late apoptotic cell in which the cellular membrane of the cell is not intact, using only a single nuclear marker and image data from the cell, the method comprising the steps of:

exposing the specific cell to only a single [[a]] nuclear marker that will bind to DNA in a nucleus of the cell in the event that the cellular membrane of the cell is not intact;

collecting image data from the specific cell;

using the image data of the specific cell to determine a spatial frequency ~~image data~~ content of a side scatter image of the specific cell ~~in which the nuclear marker is present~~; and

analyzing the ~~spatial frequency image data~~ image data of the specific cell and the spatial frequency content of the side scatter image of the specific cell to ~~determine a type of the specific cell, wherein the type of the specific cell is determined by a condition of material in a nucleus of the specific cell, as indicated by the spatial frequency image data~~ classify the cell as one of a viable cell, a necrotic cell, an early apoptotic cell, and a late apoptotic cell.

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30. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a viable cell, when:

the image data indicates that the nuclear marker has not crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell corresponds to a previously determined spatial frequency content of a side scatter image of a viable cell ~~is characterized by a relatively larger cellular area as determined from the brightfield image and no nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

31. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a viable cell, when:

the image data indicates that the nuclear marker has not crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell does not correspond to a previously determined spatial frequency content of a side scatter image of an early apoptotic cell ~~viable cell is characterized by a relatively lower scatter peak intensity as determined from the darkfield image and no nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

32. (Canceled)

33. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a cell in an early apoptotic cell when:

the image data indicates that the nuclear marker has not crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell does not correspond to a previously determined spatial frequency content of a side scatter image of a viable cell ~~the cell in the relatively early stage of apoptosis is characterized by a relatively smaller cellular area as determined from the brightfield image and no nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

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34. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a cell in an early apoptotic cell when:

the image data indicates that the nuclear marker has not crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell corresponds to a previously determined spatial frequency content of a side scatter image of an early apoptotic cell ~~the cell in the relatively early stage of apoptosis is characterized by a relatively higher scatter peak intensity as determined from the darkfield image and no nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

35. (Canceled)

36. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a late apoptotic cell when:

the image data indicates that the nuclear marker has crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell corresponds to a previously determined spatial frequency content of a side scatter image of a late apoptotic cell ~~the cell in the relatively late stage of apoptosis is characterized by a relatively smaller cellular area as determined from the brightfield image and the nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

37. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a late apoptotic cell when:

the image data indicates that the nuclear marker has crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell does not correspond to a previously determined spatial frequency content of a side scatter image of a necrotic cell ~~the cell in the relatively late stage of apoptosis is characterized by a relatively higher scatter peak intensity as determined from the darkfield image and the nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

38. (Canceled)

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39. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a necrotic cell when:

the image data indicates that the nuclear marker has crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell does not correspond to a previously determined spatial frequency content of a side scatter image of a late apoptotic cell ~~the necrotic cell is characterized by a relatively larger cellular area as determined from the brightfield image and the nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

40. (Currently Amended) The method of ~~claim 44~~ claim 29 wherein the step of analyzing determines that the specific cell is a necrotic cell when:

the image data indicates that the nuclear marker has crossed the cellular membrane; and

the spatial frequency content of the side scatter image of the specific cell corresponds to a previously determined spatial frequency content of a side scatter image of a necrotic cell ~~the necrotic cell is characterized by a relatively lower scatter peak intensity as determined from the darkfield image and the nuclear marker being present in the cell nucleus as determined by the fluorescent image~~.

41. – 44. (Canceled)

45. (New) The method of claim 1 wherein the spatial frequency content of the side scatter image is calculated by computing a standard deviation of individual pixel intensities within the image.

46. (New) The method of claim 8 wherein the spatial frequency content of the brightfield image is calculated by computing a standard deviation of individual pixel intensities within the image.

47. (New) The method of claim 16 wherein the spatial frequency content of the image is calculated by computing a standard deviation of individual pixel intensities within the image.

48. (New) The method of claim 1 wherein the spatial frequency content of the side scatter image is calculated by computing a standard deviation of individual pixel intensities within the image.

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